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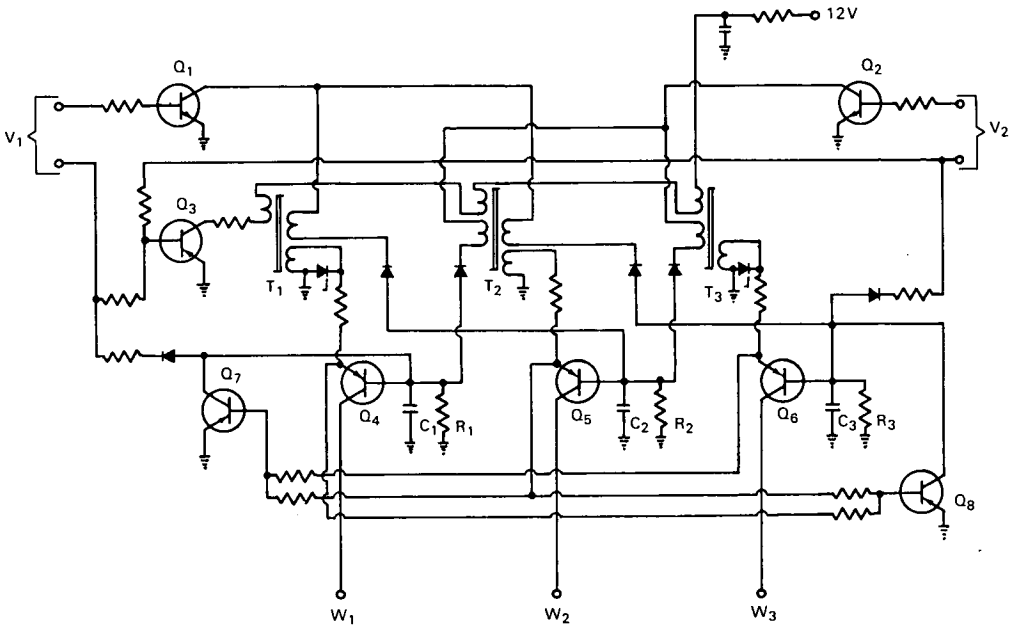
NASA TECH BRIEF

Magnetic-Shift-Register Circuit Controls Step Motor Operation



The problem: To design a controller to perform the signal conditioning required for bidirectional operation of a phase-pulsed step motor. Previous solid-state designs have the disadvantages of appreciable power drain in the standby mode plus susceptibility to switching transient interference due to their regenerative characteristic.

The solution: A single line magnetic-shift-register circuit that draws no power in standby and is non-regenerative and therefore insensitive to switching transients. Separate input terminals make it possible to drive the step motor either forward or backward.

How it's done: Drive pulses are applied at V_1 for forward operation and at V_2 for reverse operation. Transistors Q_1 and Q_2 perform switching functions for "storage" selection. The square-loop magnetic core memory elements T_1, T_2, and T_3 hold the pulse data until operation of the single shift line through Q_3 shifts the data to the temporary storage elements R_1 C_1, R_2 C_2, and R_3 C_3. Output pulses are taken from terminals W_1, W_2, and W_3 through transistors Q_4, Q_5, and Q_6, respectively.

For forward operation, the input pulse is applied directly to C_1 and an output pulse is produced at W_1. Subsequent pulses shift the pulse data from T_1 and T_2 to produce output pulses first at W_2 and then at W_3. Feedback through inhibit transistor Q_7 prevents pulses from appearing at W_1 during this interval. For reverse operation, the input pulse is applied directly to

(continued overleaf)

C_3 and stored in T_3 and T_2. Feedback in this mode is through inhibit transistor Q_8.

Notes:

1. This design can accommodate any number of stages.
2. This invention should have wide application in step motor drive systems.
3. Inquiries concerning this invention may be directed to:

   Technology Utilization Officer
   Goddard Space Flight Center
   Greenbelt, Maryland, 20771
   Reference: B65-10226

Patent status: NASA encourages the immediate commercial use of this invention. Inquiries about obtaining rights for its commercial use may be made to NASA, Code AGP, Washington, D.C., 20546.

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